AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Kholopov, A. V.

S/078/60/005/03/046/048
B004/B005

TITLE: The Phase Diagram of the Alloys of the System Chromium - Lanthanum

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 3, pp 754-755 (USSR)

ABSTRACT: The authors report on their investigation of the phase diagram of the system chromium - lanthanum up to a content of 30% of La by weight. Lanthanum exerts a modifying effect on chromium (microstructures, Fig 1). The maximum solubility of lanthanum in chromium is 1.5% by weight. In alloys with 10, 15, 20, and 30% of La by weight, a dissociation was observed in the liquid and in the solid phase. Chemical compounds of the two components were not detected. The broad zone of immiscibility is characteristic of the phase diagram (Fig 2). It is due to the great difference in atomic radii of Cr and La. There are 2 figures and 4 Soviet references.

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The Phase Diagram of the Alloys of the System Chromium - Lanthanum

S/078/60/005/03/046/048
B004/B005

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

SUBMITTED: October 21, 1959

Card 2/2

18295

S/136/60/000/01/009/021
E091/E255

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., and Naumkin, O. P

TITLE: Erbium and its Alloys

PERIODICAL: Tsvetnyye metally, 1960, 33, Nr 1, pp 43-48 (USSR)

ABSTRACT: The authors have investigated the physico-mechanical properties of erbium and its reaction with a few of the metals commonly met in industry. These investigations are a continuation of a cycle of published studies, carried out at the laboratory of rare metal alloys of the Institute of Metallurgy, AS USSR on the physico-chemical properties of rare earth metals and their alloys (Refs 3 to 8). Metallic erbium of 99.35% purity was used for the study. It contained the following chief impurities: Nd 0.1%, Ho 0.28%, Tu 0.1%, Y 0.1%, Th 0.2%, Ca 0.02%, Fe 0.01% and Cu 0.007%. The micro-structure of the original cast metallic erbium is shown in Fig 1. The hardness of metallic erbium (H_m) is 130 to 135 kg/mm^2 (Vickers). Its hardness after remelting in an argon atmosphere rose by 10 to 15 kg/mm^2. The density of erbium was determined by a hydrostatic method and also by X-ray analysis. The results were respectively

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S/136/60/000/01/009/0[illegible]
E091/E255

Erbium and its Alloys

[illegible] /cm^3. The melting point of erbium, [illegible] determined on three specimens, was 1550° [illegible]. The vapour pressure of metallic erbium was determined by the Knudsen method [illegible] evaporation from a Knudsen cell [illegible] [illegible] (tilted plate) [illegible] from one of the [illegible] of an arm of a [illegible] balance [illegible] [illegible] [illegible] [illegible] the [illegible] in [illegible] vacuum [illegible] [illegible] [illegible] an equation for the [illegible] dependence of the saturated vapour pressure [illegible] in the following form:

$$\log P = \frac{[illegible]}{T} + 6625 \pm 0.[illegible]$$

The heat of evaporation, calculated from [illegible] has been found to be [illegible] = 64.75 ± 0.215 [illegible]. The boiling point of erbium, as calculated [illegible]

Card 2/5

S/1[illegible]/[illegible]/[illegible]
A0[illegible]/A[illegible]

Erbium and its Alloys

graph of the dependence of log [illegible] on 1/T, [illegible]. The lattice constants of erbium have been determined by X-ray analysis. It has been found that erbium has a hexagonal close-packed lattice with parameters

a = [illegible] Å, [illegible] Å and the axial ratio c/a = 1.57[illegible] The authors [illegible] had the hardness, [illegible] of elasticity [illegible] and compression. The Brinell hardness of erbium [illegible] load of [illegible] kg [illegible] of 5 mm diameter, [illegible] to 100 kg/mm². [illegible] tests were carried out in a [illegible] press. [illegible] were cylinders of 5 mm diameter and 7 mm height. The UTS of erbium in compression at room temperature is 78 kg/mm², and the plasticity (percentage [illegible]) is 22%. [illegible] were carried out in a [illegible] micromachine in which the extension diagram were registered photographically. The strength and plasticity properties, as calculated from the [illegible] diagram, have the following values: UTS = [illegible] kg/mm², limit of proportionality = 19 kg/mm²; the percentage elongation does not exceed 1 to 2% and no reduction in

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E091/E255

Erbium and its Alloys

area was observed. The authors have studied the physico-chemical reactions of erbium with the basic components of industrial alloys - Mg, Al, Fe, Ti and Ta. Alloys were cast of the above metals with additions of 5 wt.% erbium. Fig 3 shows the microstructure of an Al-5% erbium alloy, Fig 4 that of an Fe-5% erbium alloy and Fig 5, that of a tantalum-erbium alloy. It was found that erbium in quantities of 5% can be melted with Al, Mg, Fe and Ti with the formation, in all cases, of 2-phased mixtures of the eutectic of peritectic type. For all investigated alloys, erbium is a good modifier and strengthener. It does not alloy with Ta. As erbium is extremely rare and expensive, it cannot be used as an alloying element for industrial alloys. Its fields of application can be in construction of special instruments, in electronic apparatus and in other directions where its particular physical properties (eg ferromagnetism, optical properties, etc) can be exploited. The further study of erbium and its alloys must concentrate on the complex of physico-chemical

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Erbium and its Alloys

properties, with the aim of developing precision alloys with special physical properties. There are 5 figures, 1 table and 11 references, 9 of which are Soviet, 1 German and 1 English.

4

Card 5/5

84675

S/136/60/000/011/008/013
E021/E406

18.0010

AUTHORS: Savitskiy, Ye.M., Terekhova, V.F. and Burov, I.V.

TITLE: Gadolinium and its Alloys

PERIODICAL: Tsvetnyye metally, 1960, 33, No.11, pp.59-64

TEXT: The gadolinium used in this investigation was produced by reduction of its fluoride with calcium. It was then distilled from a tantalum crucible and contained the following impurities: 0.1% terbium, 0.1% yttrium, 0.02% calcium, 0.03% iron and 0.1% copper. Its specific weight determined by the hydrostatic method was 7.90 and from X-ray data 7.85. Its melting point was 1325 ± 5°C. It was found to have the following mechanical properties: Brinell hardness - 60 kg/mm^2; tensile strength - 21.7 kg/mm^2; yield point 20.5 kg/mm^2; compression strength - 52.5 kg/mm^2; tensile elongation - 2%. Other properties of gadolinium were electrical resistance at 20° - 140 x 10^{-6} ohm cm. Saturation in the field of 10000 oersteds, $4\pi I_s$ = 22000 gauss at -196°C (a curve of $4\pi I_s$ against H at -196°C is shown in Fig.4). Curie temperature - 17.7°C. The crystal structure of gadolinium is close packed hexagonal with a = 3.63 ± 0.01 kX, c = 5.79 ± 0.01 kX and c/a = 1.59 ± 0.01. Preliminary work on iron-gadolinium alloys

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E021/E406

Gadolinium and its Alloys

has shown that gadolinium forms narrow regions of solubility in both α and γ iron and narrows the region of existence of the γ modification. The compound $Fe_{17}Gd_2$ (24.8 wt.% gadolinium) is formed and it is similar to Th_2Zn_{17}. Alloys with higher than 7 to 8 wt.% gadolinium are brittle at room temperature. Gadolinium forms a wide range of solubility with magnesium (at room temperature 3 to 5 wt.%). The system has a eutectic point at 28% gadolinium and 540°C. Nickel-gadolinium alloys are easily deformed in the hot condition. The microstructures of pure gadolinium (Fig.1), iron gadolinium alloys (Fig.5), magnesium-gadolinium alloys (Fig.6) and nickel-gadolinium alloys (Fig.7) are shown. There are 7 figures, 1 table and 11 references: 5 Soviet, 1 French and 5 English (one of which is translated into Russian).

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22802

18.1246 1416, 1454, 3515

S/136/61/000/005/005/008
E111/E152

AUTHORS: Savitskiy, Ye.M., Terekhova, V.F., and Naumkin, O.P.

TITLE: Ultra-light lithium alloys

PERIODICAL: Tsvetnyye metally, 1961, No.5, pp. 58-61

TEXT: Of the three metals with density under unity, sodium, potassium and lithium, the latter is both the lightest and most suitable for use in alloys. Considerable use has been made of it for deoxidizing and degassing (Refs. 1-3) and in the USSR it has been used as an alloying addition in light alloys. The object of the present work was to see whether super-light lithium alloys could be produced by adding magnesium and aluminium, which would be suitable both mechanically and in corrosion resistance for use in instruments and construction materials. For preparing binary magnesium-lithium alloys, lithium was fused under a LiCl + KCl flux and then magnesium was added, the temperature not exceeding 700 °C. For high-lithium aluminium alloys the same procedure was used, but if the lithium content was low it was added to fused aluminium. Melting was effected in armco-iron crucibles and after removal of flux alloys were poured into copper moulds. The ingots

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22802

Ultra-light lithium alloys S/136/61/000/005/005/008 E111/E152

were extruded at 200-240 °C to 10-mm diameter rods, the extrusion flow pressure decreasing from 70 to 30 kg/mm^2 with increasing lithium content. Alloy compositions and densities (determined by apparent loss in weight in paraffin) are given in Table 1 (where headings of first and second columns are "alloy compositions, % by weight from charge composition" and "density, g/cm^3", respectively; words in first column are "silumin"). Five alloys with densities 1.05-1.30 g/cm^3 were studied further. Their coefficient of thermal expansion is given in Table 2 (where the second column is headed "coefficient of linear expansion at -85 to 0 °C, degree^{-1} x 10^6"; the footnote being "for calculating the coefficient the average of the length change on heating and cooling was taken"). The mechanical properties of deformed (extent not given - abstractor) alloys are given in Table 3 (where column headings are: 1) composition, % by weight; 2) hardness HV, kg/mm^2; 3) compression strength kg/mm^2; 4) relative contraction in compression; 5) nature of fracture; 6) tensile strength kg/mm^2; 7) relative reduction in cross-sectional area, %; 8) specific strength. In column 5 alloys 1, 2, 4, "ductile, no fracture test", the others, "brittle". The footnote to column 8 reads "specific

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Ultra-light lithium alloys S/136/61/000/005/005/008
E111/E152

strength of magnesium 7.4, aluminium 2.3, lithium 2.2". Corrosion resistance in 3% aqueous NaCl (weight loss, g/m^2.hour) and in 90% humidity air (weight gain, g/m^2.day) is given in Table 4. In this table the heading of the 1st column is "composition, % by weight", 2nd and 3rd columns the two corrosion parameters given above; words in 2nd column "reaction with solution". The authors recommend ternary alloys with 7-15% Al, 15-25% Li and 60-80% Mg as structural alloys when lightness is needed; alloys with densities below unity can be used as a filler for tubes to make them rigid and yet light, as vibration absorbers under oil in instruments, and for other purposes. There are 1 figure, 4 tables and 5 references: 4 Soviet and 1 English. The English language reference reads: Ref.3: Robert S. Busk, J. of Metals, Vol.188, No.7, July 1950.

X

Card 3/6

21755

18.1235 1496.1454 also 1555

S/078/61/006/005/014/015
B121/B208

AUTHORS: Terekhova, V. F., Markova, I. A., and Savitskiy, Ye. M.

TITLE: Phase diagram of alloys of the system chromium - yttrium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 5, 1961, 1252 - 1253

TEXT: The physico-chemical reaction of chromium with yttrium and the effect of yttrium on the strength and plasticity of chromium was studied. Electrolyte chromium with a purity of 99.5% and metallic yttrium with a purity of 97%, contaminated by tantalum, niobium, and rare earths, were the starting materials for preparing the alloys. The alloys were prepared in a furnace heated by an electric arc in helium atmosphere. 23 alloys with 0.1, 0.2, 0.3, 0.5, 1, 2, 3, 5, 10, 20, 30, 50, 60, 70, 80, 85, 90, 95, 99, 99.5, and 99.8 wt% yttrium were obtained. Microstructural analyses indicated the diphase structure in alloys with 0.4% yttrium and more. Yttrium with ~13% Cr forms a eutectic at 1315 ± 7°C. Chromium and yttrium in liquid and solid state were found to be immiscible in the range of 15 - 70 wt% yttrium at a temperature of 1760 ± 25° C. The limited

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Phase diagram of alloys of ...

21755
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solubility of yttrium in solid chromium was studied by hardening the samples at 1100, 1500, and 1700°C and subsequent measuring of the microhardness and thermo-emf. The solubility of yttrium in solid chromium at 110°C is about 0.5 wt% yttrium, and at 1700°C about 1 wt% yttrium. X-ray analysis disclosed that no chemical compounds appear in yttrium - chromium alloys with 30 and 70 wt% yttrium. In the system chromium—yttrium the immiscible range is narrower than in the systems chromium - lanthanum and chromium - cerium, also the range of solid solutions. The resistance to corrosion and the plasticity of chromium at temperatures up to 1200°C are improved by adding yttrium to chromium up to 2 wt%. The results obtained by studying the effect of yttrium on the strength and plasticity of chromium will be reported later on. There are 1 figure, 1 table, and 5 Soviet-bloc references.

SUBMITTED: November 9, 1960

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24735
S/078/61/006/007/013/014
B121/B207

21.2500

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Burov, I. V., and Chistyakov, O. D.

TITLE: Phase diagram of the alloys of the system gadolinium-iron

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 7, 1961, 1732 - 1734

TEXT: The phase diagram of the alloys of the system gadolinium-iron was drawn up in all ranges of concentrations on the basis of physico-chemical analyses (thermal-, microstructural analysis, determination of hardness and microhardness, phase analysis, X-ray analysis and dilatometric studies). The alloys were prepared from distilled iron (99.9 %) and metallic gadolinium (99.0 %). The solubility of gadolinium in iron and of iron in gadolinium at room temperature does not exceed 0.2 - 0.3 % by weight. Alloys with 1 % by weight Gd already contain the phase of the $Fe_{17}Gd_2$ compound (24.8 % by weight Gd). The alloys with 25 % by weight and 58 % by weight Gd are completely one-phase in accordance with the compounds $Fe_{17}Gd_2$ (24.8 % by weight Gd) and Fe_2Gd (58.41 % by weight Gd). The alloys

with 12 % by weight Fe form a eutectic, $Gd_{solid\ solution} + Fe_2Gd$, which melts at 830 ± 7°C. An addition of Gd to the iron alloys, solidifies α-iron in the region of the solid solution. The alloys containing 15 - 60 % by weight Gd are brittle. Thermal analysis was carried out in an experimental plant for high temperatures in vacuum and inert atmosphere. On the basis of the thermal analysis, the compounds Fe_2Gd and $Fe_{17}Gd_2$ were found to form by peritectic reactions at 1080 °C and 1335 ± 10°C. The structure of $Fe_{17}Gd_2$ which has a triclinic syngony (structu type Th_2Zn_{17}) was determined by X-ray analysis and the lattice parameters were found to be a = 8.519 ± 0.003 kX, c = 12.404 ± 0.005 kX and c/a = 1.456. The compound Fe_2Gd has cubic syngony with the lattice parameter a = 7.43 kX. Admixtures of Gd (up to 3 % by weight) slightly increase the temperature of the polymorphous transformation of α into γ. The solubility limit line of Fe and Gd was not determined. A study of the magnetic properties of the alloys up to 58 % by weight Gd shows that by a Gd addition of up to 0.2 % by weight a slight increase of magnetic

24735

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B121/B207

Phase diagram of...

saturation ($4\pi I_s$) is favored. Fig. 2 shows the phase diagram of the system iron-gadolinium. P. I. Kripyakevich determined the crystal structure of the $Fe_{17}Gd_2$ compound. There are 2 figures and 4 references: 2 Soviet-bloc and 2 non-Soviet-bloc. The references to English-language publications read as follows: M. Hansen, Constitution of binary alloys, New York - London, 1958. Jr. K. A. Gschneider, J. T. Waber. Principles of alloying behavior of rare earth metals. Presented of American Society for Metals Atomic Energy Commission Symposium of the Rare Earths and Related Metals, Chicago Illinois, November, 3, 1959.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

SUBMITTED: January 28, 1961

Card 3/4

24735
S/078/61/006/007/013/014
B121/B207

Phase diagram of...

Legend to Fig. 2: a) atom % Gd, b) liquid, c) % by weight Gd

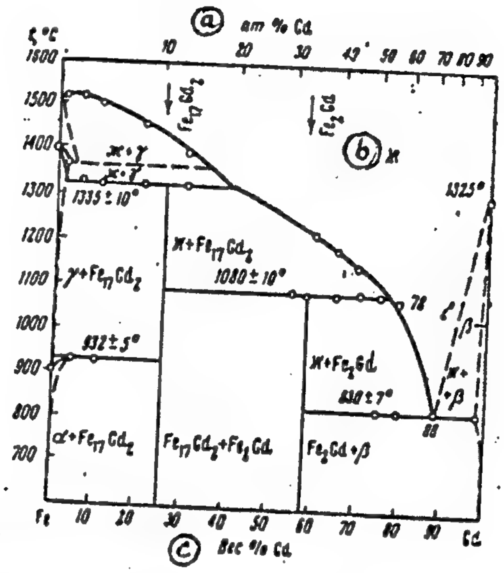

Fig. 2.

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S/078/61/006/007/014/014
B121/B207

21.2500

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Burov, I. V., and Markova, I. A.

TITLE: The phase diagram of the compounds of the magnesium-gadolinium system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 7, 1961, 1734 - 1737

TEXT: The phase diagram of the compounds of the system Mg - Gd was drawn up on the basis of physico-chemical analyses (determination of the microstructure, hardness and microhardness, thermal and X-ray studies). The alloys were produced from distilled Mg (99.99 %) and metallic Gd (99 %). The alloy with 28 % by weight Gd forms a eutectic at 540 ± 7°C. The existence of four chemical compounds, i. e., Mg_9Gd, Mg_3Gd, Mg_2Gd, and MgGd was proved on the basis of microstructural and X-ray analyses. The compounds Mg_3Gd (68.2 % by weight Gd) and MgGd (86.2 % by weight Gd) have a cubic lattice with the parameters 7.30 kX and 3.77 kX. The

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24736
S/078/61/006/007/014/014
B121/B207

compound Mg_2Gd (78 % by weight Gd) has a cubic structure of the $MgCu_2$ type. In alloys which are richer in Gd, the existence of the compound $MgGd_2$ is also assumed. The solubility of Gd in Mg at the eutectic temperature amounts to 2 - 2.5 % by weight Gd. The solubility at room temperature is not higher than 1 - 1.5 % by weight Gd. The solubility of Mg in solid Gd was not determined owing to insufficient purity of the Gd metal. An addition of Gd to Mg increases the stability of the latter. The hardness of the alloy with 7 % by weight Gd amounts to [illegible]7 kg/mm². The phase diagram of the system magnesium-gadolinium is shown in Fig. 2. Ye. N. Kunenkova made the chemical analysis of the alloys. P. I. Kripyakevich assisted in the X-ray analysis.
There are 2 figures and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR)

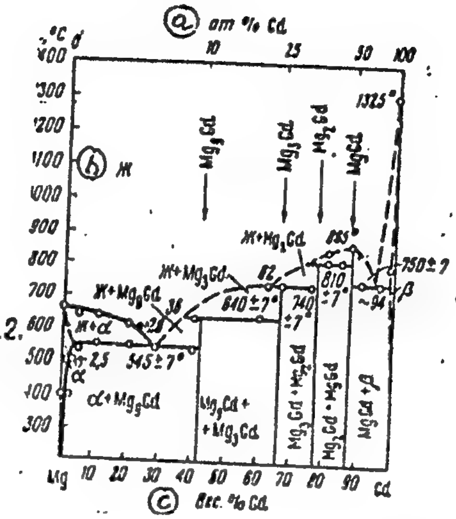
SUBMITTED: January 28, 1961

The phase diagram of...

S/078/61/006/007/014/014
B121/B207

Legend to Fig.2: a) atom % Gd; b) liquid; c) % by weight Gd.

Fig. 2.



Card 3/3

18.1235

25513

S/078/61/006/008/012/018
B127/B220

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Birun, N. A.

TITLE: Phase diagram of the system ruthenium-chromium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1960-1962

TEXT: This system was studied in order to find out the physico-chemical interaction between chromium and an element of group VIII, particularly because the favorable effect of ruthenium on the temperature decrease occurring when chromium changes from the brittle to the plastic state was known. From the literature it is evident that the following ruthenium-chromium compounds are known: σ-phase of the composition Cr_2Ru, a phase Cr_3Ru crystallizing according to type β-W, and a phase with unknown lattice of the probable composition Cr_4Ru. The solubility of chromium in ruthenium is 50at% and that of ruthenium in chromium 26at%. Electrolytically precipitated pure chromium and ruthenium of 99.8% purity were used for preparing the alloys. They were fused in an arc furnace with tungsten electrodes and in a helium atmosphere. The melting temperature

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Phase diagram of the... 25513

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B127/B220

was determined by the capillary method in an argon atmosphere. Gradual tempering was effected as follows: 100°C:100 hr; 900°C:75 hr; and 700°C:75 hr. Then, the mass was left to cool in the furnace. For tempering the alloys were maintained 20 hr at 1200°C, 24 hr at 1000°C, and 48 hr at 800°C in evacuated quartz ampullae with subsequent tempering in cooled ampullae. Hardness was measured with a Vickers apparatus at a pressure of 10 kg, and microhardness with a ПМТ-3 (PMT-3) apparatus at a pressure of 100 g. The test results (melting point, microstructure and x-ray analysis, hardness and microhardness, thermo-emf) are shown in Fig. 1. According to E. I. Gradyshevskiy, the compound Cr_3Ru has a β-W lattice with a = 4.673 Å. The hardness of the alloy increases with increasing content of ruthenium from 150kg/mm^2 to 500kg/mm^2 for alloys with 40% of ruthenium. The first crystals of the α-phase were observed at 1470°C. The parameters obtained for the σ-phase are: a = 9.10Å, c = 4.66Å, c/a = 0.513. The hardness of the alloy with 50% by weight of Ru (34at.%) varied between 600 and 1000 kg/mm^2, and the microhardness was 1200 kg/mm^2. There are 2 figures and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: Ref. 6: P. Greenfield, P. Beck. J. Metals. February, 1956.

Card 2/3

SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; NAUMKIN, O.P.

Ultralight lithium alloys. TSvet. met. 34 no.5:58-61 My '61.
(MIRA 14:5)
(Lithium-magnesium-aluminum alloys)

TEREKHOVA, Vera Fedorovna; BUROV, Igor' Vladimirovich; KUZNETSOV, P.G., ved. red.

[Physicochemical properties and the use of rare-earth metals; survey of foreign techniques] Fiziko-khimicheskie svoistva i primenenie redkozemel'nykh metallov; obzor zarubezhnoi tekhniki. Moskva, GOSINTI, 1962. 81 p. (Tema 12) (MIRA 17:4)

SAVITSKIY, Yevgeniy Mikhaylovich, prof., doktor khim. nauk; TEREKHOVA, Vera Fedorovna; BUROV, Igor' Vladimirovich; MARKOVA, Inessa Aleksandrovna; NAUMKIN, Oleg Pankrat'yevich; MUKHIN, G.G., red.izd-va; GUSEVA, A.P., tekhn. red.

[Rare-earth metal alloys]Splavy redkozemel'nykh metallov. Moskva, Izd-vo Akad. nauk SSSR, 1962. 266 p. (MIRA 15:12)

1. Laboratoriya redkikh metallov i splavov Instituta metallurgii im.A.A.Baykova (for all except Mukhin, Guseva).
(Rare earth metals)

S/193/62/000/007/001/002
A004/A101

AUTHORS: Terekhova, V. F., Candidate of Technical Sciences, Burov, I. V.

TITLE: The application of rare-earth metals in metallurgy

PERIODICAL: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 7, 1962, 3 - 6

TEXT: The authors present a survey on the application of rare-earth metals in metallurgy and mention, in the first place, the use of cerium for modifying cast iron. Investigations in this field were carried out at the Gor'kovskiy avtozavod (Gor'kiy Automobile Plant), Khar'kov "Serp i molot" Plant, Vladimir Tractor Plant, Khar'kov Plant im. V. A. Malyshev and other enterprises. Modification was carried out in the pouring ladle at a cast iron temperature of 1,400 - 1,450°C with a foundry alloy of the following composition (in %): cerium - 40-50, lanthanum - 20-24, neodymium - 15-18, magnesium - 3.5-7.5, iron - up to 10.0. The cast iron had the following mechanical properties: tensile strength - 60-70 kg/mm^2, elongation - 2-5%, notch toughness - 1.6 kgm/cm^2, Brinell hardness - 260. Cerium modifiers ensure the production of castings with spheroidal graphite, having mechanical properties which are practically the same as those of magnesium-

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The application of rare-earth metals in metallurgy S/193/62/000/007/001/002
A004/A101

modified cast iron. The optimum cerium addition amounts to some 0.03%, which also eliminates the appearance of "black spots". According to approximate calculations, cerium-modified cast iron for the automobile industry is by 15% more expensive than cast iron modified with magnesium. The authors point out that rare-earth metals are effective reducing agents, desulfurizers, modifiers and degassers of steel. They increase the output of serviceable products and improve the steel quality, particularly as regards nonmetallic inclusions. Rare-earth metals are added to cast steel to improve the fluidity, structure, deep reduction and desulfuration. The authors present a number of data concerning the effect of rare-earth metals on shaped steel castings, stainless and heat-resistant deformable steels, structural steels and Al-alloys. They mention the cast magnesium alloys МЛ11 (ML11), МЛ10 (ML10) and МЛ9 (ML9) containing up to 3% rare-earth metals, among others also neodymium. The basic deformable alloys with rare-earth metal additions are those of the magnesium-manganese-cerium system (BM17 -VM17- and MA8) and the MA11 alloy of the magnesium-manganese-neodymium-nickel system. These alloys are used in the form of sheet material, pressed shapes and other parts requiring a high corrosion resistance and good weldability. There is 1 figure.

Card 2/2

SAVITSKIY, Ye.M., doktor khim.nauk, prof.; TEREKHOVA, V.F., kand.tekhn.nauk; MARKOVA, I.A., inzh.; FILIMONOVA, R.F., inzh.

Interaction of yttrium with other metals. Metalloved. i term. obr. met. no.9:42-49 S '62. (MIRA 16:5)

1. Institut metallurgii imeni A.A.Baykova.
(Yttrium alloys—Metallography) (Phase rule and equilibrium)

AID Nr. 982-13 4 June

EFFECT OF TEMPERATURE ON MECHANICAL PROPERTIES OF URANIUM (USSR)

Savitskiy, Ye. M., M. A. Tylkina, and V. F. Terekhova. IN: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Trudy, no. 11, 1962, 133-142. S/509/62/000/011/0[illegible]/019

Mechanical properties of hot-rolled uranium (99.7% U and 0.26-0.25% C) have been tested at -196° to 1100°C. Uranium hardness was found to drop from [illegible]32 kg/mm^2 at -196°C to 21 kg/mm^2 at 800°C. The temperature coefficient of hardness for uranium was found to be [illegible]$\cdot 10^{-3}$. Cold working [illegible] [illegible] hardness to [illegible] kg/mm^2. [illegible] [illegible] to 75% at 500 to 600°C, and 37% at 650°C. To obtain a reduction of [illegible] at

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AID Nr. 982-13 4 June

EFFECT OF TEMPERATURE [Cont'd] S/509/62/000/011/010/019

100°C a stress of 90 kg/mm^2 is needed, but only 1 kg/mm^2 at 800°C. The tensile strength at room temperature was found to be 82 kg/mm^2, the elongation [illegible] and the reduction of area, 4[illegible]%. With increasing temperature the tensile strength decreases continuously, elongation and reduction first increase [illegible] at [illegible]°C, reach a maximum (~ 35% elongation, and [illegible]% [illegible] of area) at ~ [illegible]00°C and then drop sharply. The notch toughness [illegible] [illegible] m^2, it rises [illegible] at [illegible] [illegible] and [illegible] ~ 2 $kg\text{-}m/cm^2$ at ~ 850°C. The latter [illegible] proves the high ductility of γ-uranium. The same temperature dependence is observed in impact upsetting: with a single hammer blow the specimens can be upset, without cracks, by 90% at 800° C and by 99.7% at 1000° C, but by only 9.5% at 700° C. These results confirm the existence of the three allotropic transformations which uranium undergoes with increasing temperature, with the α-phase having a medium ductility, the tetragonal bic β-phase a very low ductility, and the cubic γ-phase a very high ductility.

ND

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S/078/62/007/010/002/008
B144/B186

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Birun, N. A.

TITLE: Phase diagram of the magnesium-palladium system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 10, 1962, 2367-2373

TEXT: A complete phase diagram of the Mg - Pd system (Fig. 2) was established, based on thermal, microstructural and X-ray diffraction analyses and on the determination of specific weight, hardness, and microhardness. The specific weight of the alloys increases up to a Pd content of 50% by weight, at first slowly and then rapidly. The microstructural analysis shows that the solubility of Pd in Mg does not exceed 0.55% by weight at room temperature and is ~1% by weight at the eutectic. The solubility of Mg in Pd is ≈6% by weight at the eutectic, and 5% at room temperature. The compound $MgPd_3$ found by R. Ferro (J. Metals, 1, 424 (1959)) by microstructural and X-ray analyses was not confirmed. X-ray diffraction analysis of samples, annealed at 400°C for 250 hrs, revealed that Mg_6Pd has a cubic lattice with a = 10.0 kX and proved the existence

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of Mg_4Pd and MgPd. The structure of the other compounds remains to be elucidated. The Brinell hardness increased up to 230 with a Pd content of 39% by weight; it could not be measured from 39 to 87% because of the brittleness of the alloys, and it decreased from 218 to 101 when the Pd content was increased from 87 to 92% by weight. Microhardness ranged from 180 - 260 kg/mm^2. Conclusion: The system is made up of 5 chemical compounds whereof 3 are formed by peritectic reactions, namely: Mg_6Pd, Mg_4Pd, and Mg_3Pd. Mg_2Pd_3 melts congruently at 1350 $\pm$ 10°C. When the temperature is reduced, MgPd forms at 700 $\pm$ 10°C from Mg_3Pd and Mg_2Pd_3. There are 5 figures and 2 tables.

SUBMITTED: January 16, 1962

Fig. 2. Phase diagram of the Mg - Pd system.
Legend: (a) Pd, % by weight; (b) Pd, at.-%.

SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; BUROV, I.V.

Phase diagram of the system of cobalt-gadolinium alloys.
Zhur.neorg.khim. 7 no.11:2572-2574 N '62. (MIRA 15:12)
(Cobalt-gadolinium alloys)

BOYKO, I.D.; BYLINKINA, Ye.S.; TEREKHOVA, V.F.; NECHAYEVA, M.G.

Isolation of antibiotics from culture liquids without detachment of the mycelium. Med.prom. 16 no.7:18-25 Jl '62. (MIRA 15:10)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut antibiotikov.
(ANTIBIOTICS) (CHEMISTRY, MEDICAL AND PHARMACEUTICAL)

TEREKHOVA, V. F.,

"Main achievements in the study of physicochemical properties, development of methods of refining rare-earth metals (zone refining, distillation), single-crystal growing, and plotting phase diagrams of rare-earth metals with the elemtns of all group of the periodic table"

report presented at the Conf. on New Trends in the Study and Applications of Rare Earth Meals, Moscow, 18-20 Mar 63

ACCESSION NR: AR4027928 S/0137/64/000/002/V044/V044

SOURCE: RZh. Metallurgiya, Abs. 2V302

AUTHOR: Savitskiy, Ye. M.; Terekhova, V. F.

TITLE: Physicochemical principles of modification of cast iron and steel by rare earth metals

CITED SOURCE: Sb. Mekhan. svoystva litogo met. M., AN SSSR, 1963, 71-76

TOPIC TAGS: rare earth metal, deoxidizer, desulfurizer, cast iron modification, steel modification

TRANSLATION: The physicochemical principles of modifying cast iron and steel by rare earth metals are discussed. Rare earth metals are strong deoxidizers for most metals and alloys, and their introduction into metals improves the mechanical properties. In deoxidizing steel, 0.2-0.3% of total rare earth metals (mischmetal or Fe-Ce) is recommended. For economy purposes, it is recommended that the deoxidation by rare earth metals be carried out in ladles for deep deoxidation and only in the case of high-quality steels. Rare earth metals are good desulfurizers. Because of their high chemical activity, they bind low-melting compounds, which

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ACCESSION NR: AR4027928

cause red shortness (S, P, As, Pb, Bi, Sn, etc.), into high-melting binary and more complex compounds which can be removed with the slag. When rare earth metals are added to cast irons, the transformation of lemellar graphite into spheroidal graphite is observed. G. Lyubimova

DATE ACQ: 19Mar64 SUB CODE: ML ENCL: 00

Card 2/2

KRIPYAKEVICH, P.I.; TEREKHOVA, V.F.; ZARECHNYUK, O.S.; BUROV, I.V.

Crystalline structures of certain intermetallic compounds of gadolinium and neodymium. Kristallografiia 8 no.2:268 Mr-Ap '63. (MIRA 17:8)

1. L'vovskiy gosudarstvennyy universitet imeni Franko i Institut metallurgii imeni Baykova AN SSSR.

ACCESSION NR: AP3000200 S/0136/63/000/005/0051/0053

AUTHOR: Savitskiy, Ye. M.; Terekhova, V. F.; Naumkin, O. P.; Burov, I. V. 66 65

TITLE: Growing scandium, yttrium, and gadolinium single crystals 14

SOURCE: Tsvetny*ye metally*, no. 5, 1963, 51-53

TOPIC TAGS: single crystals, scandium, yttrium, gadolinium, microhardness

ABSTRACT: A method of growing Sc, Y, and Gd single crystals has been developed at the Institut metallurgii im. A. A. Baykova (Institute of Metallurgy). The commercial grades of these metals have a purity not exceeding 98%. Oxygen, calcium, copper, iron, tantalum, fluorine, and other rare-earth metals are the main impurities. The commercial-grade Sc, Y, and Gd were first refined by electron-beam zone melting and high-vacuum distillation to a purity of 99.3 to 99.5%, mainly, by removal of such impurities as O_2, Ta, and Ca. The dissolved rare-earth metals could not be eliminated. Single crystals with cross sections of 5 x 5 to 10 x 12 mm were grown from distilled metals by recrystallization annealing in vacuum at 1000 — 1400C (depending on the metal). Other methods of crystal growing did not yield satisfactory results. The crystal orientation was determined by x-ray diffraction. The average microhardness of Sc single crystals

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[illegible]

ACCESSION NR: AP3000200

was 210 kg/mm^2 on the basis face and 100 to 110 kg/mm^2 on the prism face. Studies of the electrical and magnetic properties, coefficient of heat expansion, and ductility of Ce, Y, and Gd single crystals are being continued and will be the subject of another report. Orig. art. has: 4 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 00	DATE ACQ: 14Jun63	ENCL: 00
SUB CODE: ML, MA	NO REF SOV: 003	OTHER: 003

Card 2/2

AUTHOR: Terekhova, V. F.

TITLE: Alloys from rare earth metals

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1963, 47-53

TOPIC TAGS: Y, Sc, Gd, Nd, noble metal, Mg, La, Ce, Pr, Al, Ti, Nb, Ta, V, Cr, yttrium, scandium, gadolinium, neodymium, magnesium, lanthanum, cerium, praseodymium, aluminum, titanium, niobium, tantalum, vanadium, chromium

ABSTRACT: Author was one of a group which studied the basic physical [illegible] of rare earth metals. Monocrystals [illegible]

[illegible]

[illegible] rare earths. [illegible] metals [illegible] grain edges and they [illegible] diagrams [illegible] author constructed [illegible] diagrams [illegible] rare earths and analyzed these diagrams and alloy properties by the groupings in the periodic table.

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L 17459-63

ACCESSION NR: AP3004787

Of the elements in group II, alloys of magnesium with lanthanum, cerium, praseodymium, neodymium, gadolinium and some other rare earths were studied in detail. Of the third group, author analyzed alloys of aluminum with neodymium and yttrium. In the fourth group, the interaction of titanium with lanthanum, cerium, neodymium, yttrium and scandium was studied. Of the fifth group of elements, the interaction of lanthanum, cerium and yttrium with niobium, tantalum, and vanadium was studied. In the sixth group, alloys of chromium with lanthanum, cerium and yttrium were studied. Orig. art. has: 7 figures.

ASSOCIATION: Institut metallurgii im. Baykova (Institute of metallurgy)

SUBMITTED: 00 DATE ACQ: 06Sep63 ENCL: 00

SUB CODE: ML NO REF SOV: 005 OTHER: 001

Card 2/2

SAVITSKIY, Ye. M.; BUROV, I. V.; TEREKHOVA, V. F.; KASHIN, V. I.

Iron-aluminum alloys with additions of rare and rare-earth metals. Trudy Inst. met. no.13:163-170 '63. (MIRA 16:4)

(Iron-aluminum alloys—Metallurgy)
(Metals, Rare and minor)

E075/E335

AUTHORS: Kripyakevich, P.I., Terekhova, V.F., Zarechnyuk, O.S. and Burov, I.V.

TITLE: Crystal structures of some intermetallic compounds of gadolinium and neodym

PERIODICAL: Kristallografiya, v. 8, no. 2, 1963, 268

TEXT: Earlier published results of the authors of X-ray structural investigations on the alloy gadolinium with about 80.8 at.% (60% by weight) Fe have shown that this alloy consists basically of a compound with a Th_2Zn_{17} type structure (hexagonal syngony, c/a = 1.456) and the formula Gd_2Fe_{17} was ascribed to this compound. According to data published by Novy, Vickery and Kleber (Trans. Met. Soc. AIME, 221, 3, 580, 1961) the compound Gd_2Fe_{17} has a hexagonal structure with c/a = 0.983, i.e. corresponding to the type Th_2Ni_{17}. The authors of this paper carried out a more detailed investigation of Fe-rich alloys of the system Gd-Fe and found that both the above mentioned compounds exist : the type Th_2Zn_{17} compound (a = 8.55, c = 12.40 Å, c/a = 1.450) is the main component of the alloy with 86.8 at.%

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Crystal structures of S/070/63/008/002/010/017
E073/E335

(70% by weight) Fe in the charge; the type Th_2Ni_{17} (a = 8.50, c = 8.35 Å, c/a = 0.984) compound is the basic component of the alloy with [illegible] at.% ([illegible] by weight) Fe. The ranges of homogeneity of these compounds are being studied to determine them more accurately. Contrary to the findings of Novy, Vickery and Kleber, the authors of this paper found that the compound [illegible] c/a = [illegible]) and not $GdCo_5$. For compounds of Nd with Fe, which are in equlibrium with α-Fe, the authors found that their structure was of the type Th_2Zn_{17} (a = 8.59, c = 12.47 Å, c/a = 1.451). For $GdRu_2$ Compton and Matthias (Acta crystallogr., 12, 9, 651, 1959) found that the structure was of the type $MgZn_2$. However, the authors of this communication found that it also had a second modification with a structure of the type $MgCu_2$(a = 7.56 Å). In the system GdMg the existence of the following compounds was established: GdMg(type CsCl, a = 3.79 Å); $GdMg_2$(type $MgCu_2$, a = 8.55 Å); $GdMg_3$(type BiF_3, a = 7.31 Å).

Card 2/3

Crystal structures of S/070/63/006/002/010/017
E073/E335

ASSOCIATIONS: L'vovskiy gosudarstvennyy universitet im. I. Franko (L'vov State University im. I. Franko)
Institut metallurgii im. A.A. Baykova (Institute of Metallurgy im. A.A. Baykov)

SUBMITTED: July 9, 1962

Card 3/3

AUTHOR: Terekhova, V. F.; Markova, I. A.; Savitskiy, Ye. M.

TITLE: Phase diagram of alloys of the yttrium-tin system

SOURCE: Zhurnal neorganicheskoy khimii, v. 8, no. 8, 1963, 1991-1993

TOPIC TAGS: yttrium-tin system, yttrium-tin-system phase diagram, yttrium-tin mutual solubility, yttrium-tin compound, yttrium-tin-alloy brittleness, yttrium-tin-alloy oxidation

ABSTRACT: Sixteen Y-Sn alloys with 0 to 100% Sn were melted from 99% pure Y and 99.9% pure Sn in an arc furnace in a helium atmosphere. The alloys were vacuum-annealed: Y-rich alloys (up to 40 wt% Sn), for 150 hr at 1200C; alloys with 40—70 wt% Sn, for 150 hr at 1000C; and Sn-rich alloys (up to 25 wt% Y), for [illegible] hr at 200C. Results of metallographic, x-ray diffraction, and thermal analyses and hardness tests were used as a basis for plotting the phase diagram of the system (see Fig. 1 of Enclosure). Alloys with [illegible] wt% Sn oxidize readily in air and are very brittle. On the Sn side there is probably a pseudoeutectic close to pure Sn. Microscopic and x-ray diffraction-pattern examination (the latter

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L 14287-63
ACCESSION NR: AP300....

carried out by [illegible] indicates a possibility of the existence of two compounds whose structure has not yet been determined. The solubility of Sn in solid Y does not exceed 1 wt%. The maximum solubility of Y in solid Sn is 0.3 wt%. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 18Feb63 DATE ACQ: 21Aug63 ENCL: 01

SUB CODE: ML NO REF SOV: 001 OTHER: 001

Card 2/3

L 14417-63 EWP [illegible] AFFTC/ASD [illegible]

ACCESSION NR: AP3004357 S/0078/63/008/008/1998/2000

AUTHOR: Markova, I. A.; Terekhova, V. F.; Savitskiy, K. M.

TITLE: Phase diagram of the praseodymium-neodymium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 8, no. 8, 1963, 1998-2000

TOPIC TAGS: praseodymium-neodymium phase diagram, praseodymium-neodymium system, α-praseodymium, β-praseodymium, α-neodymium, β-neodymium, praseodymium-neodymium solubility, praseodymium-neodymium solid solution

ABSTRACT: The phase diagram of the praseodymium-neodymium system, based on the study of Pr-Nd alloys, is given in Fig. [illegible] of the Enclosure. The alloys were [illegible] [illegible] in a [illegible] impurities were other rare-earth [illegible] and [illegible], Fe, and Ca. The [illegible] were annealed at [illegible] for [illegible] hr. Thermal analysis, microscopic examination, x-ray diffraction patterns, and [illegible] tests showed that both modifications of Pr and Nd — the hexagonal [illegible] modification and the [illegible] high-temperature [illegible]-modification — form [illegible] series of solid solutions. The

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ACCESSION NR: AP4004686

S/0126/63/016/005/0663/0668

AUTHORS: Naumkin, O. P.; Terekhova, V. F.; Savitskiy, Ye. M.

TITLE: Anisotropy of properties of scandium single crystal

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 5, 1963, 663-668

TOPIC TAGS: anisotropy, scandium property, scandium anisotropy, scandium single crystal, thermal emf, scandium microhardness, scandium magnetic property, single crystal anisotropy, crystal anisotropy, magnetic property, single crystal, scandium

ABSTRACT: The electrical, mechanical, and magnetic properties of scandium single crystals have been investigated. Specimens (9 x 6 x 14 mm) were prepared by the method of recrystallization annealing. At room temperatures the crystal exhibits a close-packed hexagonal structure, determined by the Laue method. The specimen is shown to possess an anisotropy along the principal direction of the hexagonal lattice. The magnitude of anisotropy determined by measuring the thermal emf along axes a and c was 200%, using the expression $e_{Sc} = -\frac{\Delta E_a}{\Delta E_c} \cdot e_c + e_{Cu}$. Measuring the microhardness on the planes (0001) and $(10\bar{1}0)$, this value was 100%, whereas the inverse paramagnetic permeability in a field parallel and perpendicular to the

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ACCESSION NR: AP4004686

c-axis gave a value of 30% at room temperature. The microhardness on the (0001) plane was 210 kg/mm^2 and on $(10\bar{1}0)$ it was 102 kg/mm^2. "The author is grateful to R. M. Liberman (Giredmet) for procuring the specimens, to V. Sh. Shekhtman (IMET im. A. A. Baykova) for helping in crystal orientation, and to A. A. Babareko (IMET im. A. A. Baykova) for his advice." Orig. art. has: 4 figures, 2 tables, and 2 formulas.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 16Jan63 DATE ACQ: 03Jan64 ENCL: 00

SUB CODE: MM NO REF SOV: 004 OTHER: 006

Card 2/2

SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; NAUMKIN, O.P.; BUROV, I.V.

Obtaining single crystals of scandium, yttrium, and gadolinium. TSvet. met. 36 no.5:51-52 My '63. (MIRA 16:10)

CHECHERNIKOV, V.I.; IULIU POP; NAUMKIN, O.P.; TEREKHOVA, V.F.

Magnetic properties of scandium. Zhur. eksp. i teor. fiz. 44 no.1:387-389 Ja '63. (MIRA 16:5)

1. Moskovskiy gosudarstvennyy universitet i Institut metallurgii AN SSSR.

(Scandium—Magnetic properties)

S/053/63/079/002/003/004
B102/B186

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Naumkin, O. P.

TITLE: The physico-chemical properties of the rare-earth metals, scandium and yttrium

PERIODICAL: Uspekhi fizicheskikh nauk, v. 79, no. 2, 1963, 263 - 293

TEXT: This is a review article that covers the most important literature of the last 10 years. It contains the following chapters: (1) Electron structure of the rare-earth metals; (2) Chemical properties; (3) Physical properties (lattice structure, density, melting point and polymorphous transition point, vapor pressure, boiling point and evaporation temperature, thermal expansion, electrical properties, specific heat and thermal conductivity, magnetic properties); (4) Mechanical properties (elastic constants and their temperature dependence, methods of investigating the mechanical properties, hardness, mechanical properties in the case of deformation, pressure treatment of rare-earth metals). There are 14 figures, 15 tables, and 116 references.

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[illegible], Ye.[illegible], prof., doktor khim. nauk, otv. red.; [illegible] V., [illegible], kand. tekhn. nauk, otv. red.

[Theory of rare earth metals and their applications; materials] Voprosy teorii i primeneniia redkozemel'nykh metallov; materialy. Moskva, Nauka, 1964. 270 p. (MIRA 17;8)

1. Vsesoyuznoye soveshchaniye po splavam redkikh metallov. 1963.

TOPIC TAGS: yttrium physicochemical property, distilled yttrium, yttrium alloy, yttrium

L 10437-65

ACCESSION NR: AP4019204 S/0056/64/046/002/0444/0446

AUTHORS: Chechernikov, V. I.; Pop, Iuliu; Terekhova, V. F.; Kolesnichenko, V. Ye.

TITLE: Magnetic properties of single-crystal and polycrystalline yttrium

SOURCE: Zhurnal eksper. i teor. fiz., v. 46, no. 2, 1964, 444-446

TOPIC TAGS: yttrium, single crystal yttrium, polycrystalline yttrium, Curie Weiss law, paramagnetic Curie temperature, magnetic susceptibility, susceptibility temperature dependence, transition metal, d band electron, s band electron

ABSTRACT: The magnetic susceptibility of yttrium was studied for the purpose of obtaining new information on the role of d- and s-electrons in the magnetic properties of weakly magnetic transition metals. The temperature dependence of the magnetic susceptibility

ACCESSION NR: AP4019204

was measured between 77 and 1000K by the Sucksmith method. In the single-crystal yttrium the magnetic susceptibility was higher when measured at right angles to the c-axis than parallel to this axis. The temperature dependence of the susceptibility is attributed to the presence of collective-state electrons of the d-s band and electrons of the d-band, subjected to spatial localization. Use of the Curie-Weiss law yields for the paramagnetic Curie point values $\Theta_{p\parallel} = -510K$, $\Theta_{p\perp} = -330K$, and $\Theta_{p.polycr.} = -390K$. It is suggested that in view of the below-zero Curie temperature an antiferromagnetic interaction may exist in metallic yttrium. "In conclusion, the authors express their gratitude to Prof. Ye. I. Kondorskiy for valuable remarks." Orig. art. has: 1 figure and 3 formulas.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet (Moscow State University)

SUBMITTED: 05Jul63 DATE ACQ: 27Mar64 ENCL: 01

SUB CODE: PH NO REF SOV: 002 OTHER: 004

Card 2/2

L 6975-66 EWP(s)/EWT(m)/EWP(b)/EWP(t) IJP(c) JD/HM/JG/MPW(ol)

ACC NR: AP5018871

SOURCE CODE: UR/0126/65/020/001/0157/0159

AUTHOR: Chechernikov, V. I.; Speranskiy, N. M.; Terekhova, V. F.; Rozhkova, R. S.

ORG: Moscow State University im. M. V. Lomonosova (Moskovskiy gosuniversitet)

TITLE: Several magnetic properties of Ni-Eu alloys

59

B

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 1, 1965, 157-159

TOPIC TAGS: Europium compound, nickel containing alloy, magnetic property, paramagnetic susceptibility

ABSTRACT: Temperature dependence (300-1000°C) of paramagnetic susceptibility using the Faraday method at 10^{-3} to 10^{-4} mm Hg was studied for specimens containing 0.77, 2.0, 3.26, 3.6 and 6.38% Eu. Samples of electrolytic Ni of 99.9% purity and Eu not containing more than .2% total impurities were cast and remelted under 15 atm of helium 3-4 times in a tungsten-arc furnace and then homogenized for 100 hrs at 1100°C. Microstructural examination showed the presence of a eutectic Ni(α) + $Ni_{17}Eu_2$, which increased with increasing Eu. The eutectic transformation temperature was 1190 ± 10°C. The solubility of Eu in Ni does not exceed 0.77% at.% Eu.

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UDC: 546.661 : 538.214

L 6975-66

ACC NR: AP5018871

O

The compound Eu_2Ni_{17} (Th_2Ni_{17} type) was indexed at c/a = 0.963 giving lattice parameters a = 8.36 Å and c = 8.09 Å and intensity measurements indicate an hexagonal structure. The hardness of the compound was 271 kg/mm^2 as compared with 70 kg/mm^2 for pure Ni. The variation of the reciprocal of the susceptibility $1/\chi$ with temperature is shown in fig. 1. The Curie-Weiss equation gives the susceptibility where χ_k is the temperature insensitive susceptibility. The susceptibility of Ni - 6.38% Eu is almost an order of magnitude greater than for pure nickel. The magnetic moment R_R is almost independent of the composition - a small increase in R_R takes place at 6.38% Eu. The paramagnetic Curie point θ_R drops initially with increasing Eu and then from 3.0 to 6.38% Eu remains constant. Orig. art. has: 1 figure and 1 formula.

SUB CODE: MM/ SUBM DATE: 24Oct64/ ORIG REF: 000/ OTH REF: 000

Card 2/3

L 6275-66
ACC NR: AP5018871

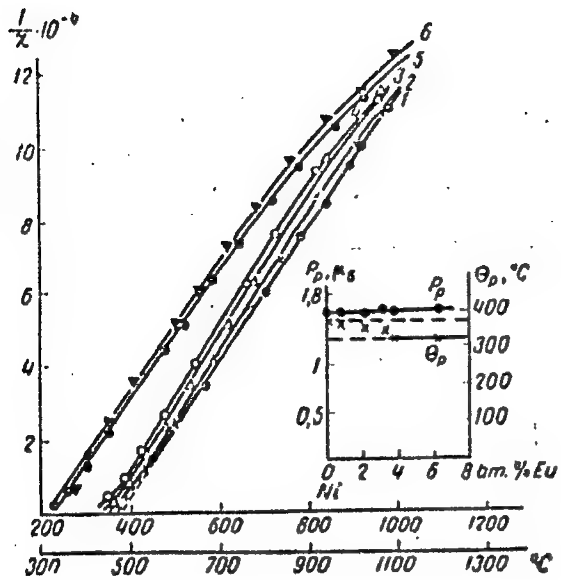

Fig. 1. Dependence of $1/\chi$ on T for specimens with varying Eu content. 1 - Ni; 2 - 0.77; 3 - 2.0; 4 - 3.2 at. % - (upper temperature scale); 5 - 3.6; 6 - 6.8 at. % - (lower temperature scale). Lower right shows the dependence of R_R and θ_R on Eu content.

Card 3/3 rds

L 1358-66 EWT(m)/EWP(w)/EWG(m)/T/EWP(t)/EWP(b) IJP(c) RDW/JD

ACCESSION NR: AP5021942 UR/0126/65/020/002/0299/0301
546.657:538.214

AUTHOR: Chechernikov, V.I.; Sperenskiy, N.M.; Maslova, E.V.; Terekhova, V.F.

TITLE: Magnetic properties of iron-neodymium alloys

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 2, 1965, 299-301

TOPIC TAGS: iron containing alloy, neodymium containing alloy, magnetic properties, constitution diagram, ferromagnetic region, paramagnetic region, Curie point, antiferromagnetic interaction, three sublattice structure

ABSTRACT: Pure carbonyl iron (99.9%) and neodymium metal (99.5%) were smelted together in an arc furnace with a nonconsumable tungsten electrode in a purified helium atmosphere under a pressure of 300-400 mm Hg. The resulting alloys containing different proportions of Fe to Nd were remelted several times to assure homogeneity and annealed in evacuated quartz ampoules at 600 and 900°C for 130 hr. Subsequent microstructural and X-ray analyses of the sphere- and rod-shaped specimens showed that most of the obtained alloys are of two-phase kind and represent mechanical mixtures of solid solutions (based on pure components) with chemical compounds ($Fe_{17}Nd_2$ and Fe_2Nd). Such a type of constitution diagram largely deter-

L 1358-66

ACCESSION NR: AP5021942

mines the magnetic properties of these alloys. The magnetic properties were investigated with the aid of the magnetic scale described by V. I. Chechernikov (Vestnik MGU, ser. fiz., 1957, no 1, 47), at first in the ferromagnetic region. It turned out that in alloys containing from 10.52 to 85 at.% Nd, below the ferromagnetic Curie point θ_f there exists a temperature range in which magnetization decreases to a minimum whereupon it again rises, and then again drops to zero at $T = \theta_f$. The investigations were also carried out in the paramagnetic region, where they made it possible to calculate the effective magnetic moment P_p and the temperature of the paramagnetic Curie point. The temperature range of investigations in both the ferromagnetic and the paramagnetic regions was 300-1300°K. It is concluded from the findings that in the Fe-Nd alloy system there exists, along with the ferromagnetic, also an antiferromagnetic interaction which is most clearly manifested in the case of the one-phase compound $Fe_{17}Nd_2$. As the experiments revealed, in the region of existence of this compound the magnetic moment of alloy reaches a minimum and the paramagnetic Curie point is much lower than in pure iron. It is possible that a three-sublattice structure exists in the Fe-Nd system, with positive interaction existing between homogeneous atoms and negative interaction between the atoms of Fe and Nd. The magnetization of Fe-Nd alloys throughout the temperature range investigated is conditioned by the Fe atoms; it is not completely compensated, since the magnetic moment of the Fe atom exceeds that of the Nd atom. "In conclusion the

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authors wish to express their gratitude to Professor Ye. I. Kondorskiy for discussion of the findings and constructive advice." Orig. art. has: 3 figures, 1 table.

ASSOCIATION: Moskovskiy gosuniversitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 21Jul64 ENCL: 00 SUB CODE: EM, MM

NO REF SOV: 002 OTHER: 001

Pure metal

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L 14617-66 EWT(1)/EWT(m)/T/EWP(t)/EWP(b) IJP(c) GG/JD/JG

ACC NR: AT6002265 (A) SOURCE CODE: UR/2564/65/006/000/0301/0307

AUTHOR: Savitskiy, Ye. M.; Terekhova, V. F.; Naumkin, O. P.; Burov, I. V.

ORG: none

TITLE: Preparation and properties of rare earth single crystals [Paper presented at the Third Conference on Crystal Growing held in Moscow from 18 to 25 November, 1963]

SOURCE: AN SSSR. Institut kristallografii. Rost kristallov, v. 6, 1965, 301-307

TOPIC TAGS: single crystal growing, rare earth metal, crystallization

ABSTRACT: A technique and apparatus were developed for purifying and growing single crystals of rare earth metals. The growing technique consisted of (1) purifying technical-grade metals by vacuum distillation; (2) vacuum remelting of the distillate with directional crystallization; and (3) recrystallization annealing in a high vacuum. Single crystals of scandium, yttrium, gadolinium, and neodymium 8 x 10 x 12 mm were thus grown, and some physical constants and anisotropy of the mechanical, electrical, and magnetic properties were determined along various crystallographic directions. The data obtained showed that

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ACC NR: AT6002265

3

a complex electron spin configuration exists in gadolinium at temperatures below 75C. V. Ye. Kolesnichenko participated in the work of growing yttrium and neodymium single crystals. Orig. art. has: 8 figures.

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 004 / OTH REF: 001

TS

Card 2/2

SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; BUROV, I.V.; NAUMKIN, O.P.; MARKOVA, I.A.

Alloys and compounds of rare-earth metals. Izv.AN SSSR.Neorg.mat.
1 no.10:1648-1659 O '65. (MIRA 18:12)

1. Institut metallurgii imeni A.A.Baykova, Moskva. Submitted
July 5, 1965.

L 32667-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/JG/GD
ACC NR: AT6016409 (A) SOURCE CODE: UR/0000/65/000/000/0051/0053

AUTHORS: Naumkin, O. P.; Terekhova, V. F.; Chistyakov, O. D.; Savitskiy, Ye. M.

ORG: none

TITLE: Purification of metallic scandium by distillation 27 18

43
B+1

SOURCE: AN SSSR. Institut metallurgii. Metallovedeniye legkikh splavov (Metallography of light alloys). Moscow, Izd-vo Nauka, 1965, 51-53

TOPIC TAGS: scandium, metal purification, high purity metal

ABSTRACT: Preparation of metallic scandium of 99.4--99.6% purity 14 by distillation of the technical 96--97% material is described as a continuation of the study of the physical and chemical properties of this metal by Ye. M. Savitskiy, V. F. Terekhova, O. P. Naumkin, and I. V. Burov (Tsvetnyye metally, 1963, No. 5, 51). The distillation was performed at 1650C and 10^{-4} mm Hg in an apparatus presented schematically in Fig. 1. Microscopic study of the obtained product shows improvement in its structure. The hardness and electrical resistance are lowered while ductility of the purer material is increased. Detailed chemical analysis of the product is reported. The authors express their gratitude to A. N. Shteynberg (IMYeT im. A. A. Baykov) for spectral analysis and to R. M. Liberman (Giredmet) for collaboration.

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L 32667-66

ACC NR: AT6016409

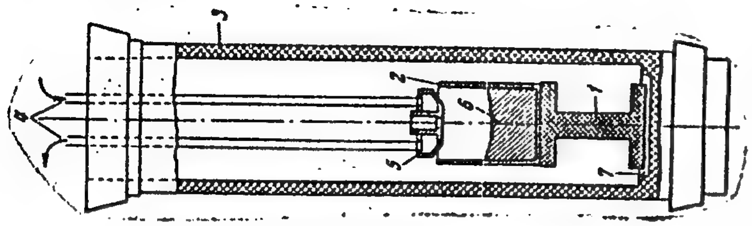

Fig. 1. Diagram of the equipment for distillation of metallic scandium: 1 - graphite base; 2 - tantalum crucible; 3 - graphite heater; 4 - water; 5 - copper condenser; 6 - metallic scandium; 7 - beryllium oxide packing.

Orig. art. has: 2 figures and 1 table.

SUB CODE: 11,07/ SUBM DATE: 16Sep65/ ORIG REF: 005/ OTH REF: 002

Card 2/2 BLG

ACC NR: AT6016408 (A) SOURCE CODE: UR/0000/65/000/000/0041/0050

AUTHORS: Savitskiy, Ye. M.; Terekhova, V. F.; Burov, I. V.; Naumkin, O. P.

ORG: none

TITLE: Investigation of monocrystals and alloys of rare earth metals

SOURCE: AN SSSR. Institut metallurgii. Metallovedeniye legkikh splavov (Metallography of light alloys). Moscow, Izd-vo Nauka, 1965, 41-50

TOPIC TAGS: alloy, rare earth metal, phase diagram, metal crystal

ABSTRACT: A method for the growth of monocrystals and Sc, Y, Gd, and Nd was developed, and some properties, e.g., microhardness, thermal emf, and magnetic susceptibility, of the crystals were determined. The monocrystals were obtained by high-temperature vacuum annealing of distilled metal specimens possessing a high degree of crystal orientation. The experimental results are presented graphically (see Fig. 1). In addition, the phase diagrams were determined for the binary systems: Sc—Er, Gd—Tb, Ce—Sc, Ce—Gd, Sc—Al, Y—Sn, and Fe—Nd (see Fig. 2).

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L 39883-66
ACC NR: AT6016408

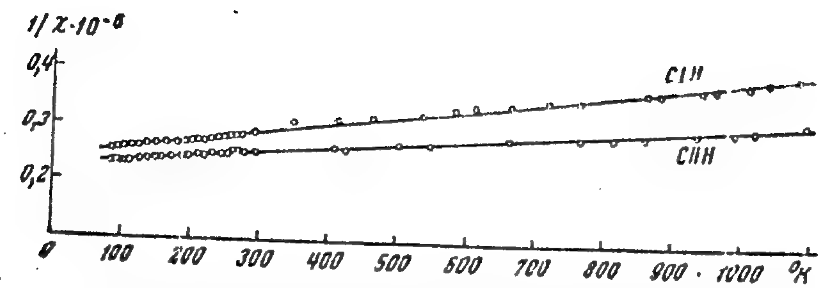

Fig. 1. Anisotropy of the specific magnetic susceptibility in monocrystals of Sc.

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APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001755320014-3"

ACC NR: AT6016403

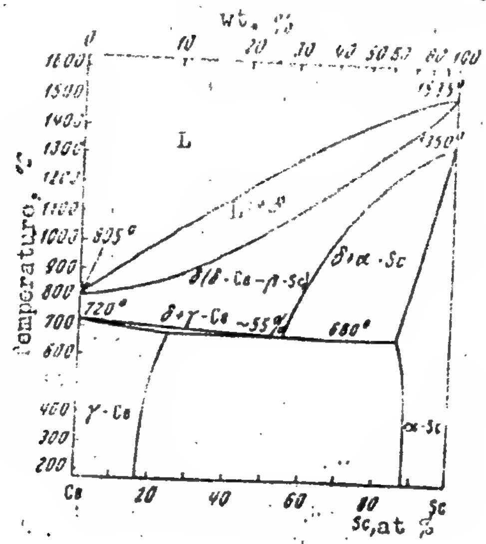

Fig. 2. Phase diagram of the system Ce--Sc.

Orig. art. has: 13 figures.

SUB CODE: 11,20/SUBM DATE: 16Sep65/ ORIG REF: 007/ OTH REF: 004

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BAYTENOV, M.S.; VASIL'YEVA, A.N.; GAMAYUNOVA, A.P.; GOLOSKOKOV, V.P.; ORAZOVA, A.; ROLDUGIN, I.I.; SEMIOTROCHEVA, N.L.; FISYUN, V.V.; TEREKHOVA, V.I.; PAVLOV, N.V., akademik, glav. red.; BYKOV, B.A., red.; GOLOSKOKOV, V.P., kand. biolog. nauk, red.; KUBANSKAYA, Z.V., kand. biolog. nauk, red.; SUVOROVA, R.I., red.; ALFEROVA, P.F., tekhn. red.

[Flora of Kazakhstan] Flora Kazakhstana. Glav. red. N.V.Pavlov i dr. Alma-Ata, Izd-vo Akad. nauk Kazakhskoi SSR. Vol.5. 1961. 512 p.

(MIRA 14:10)

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